Summary

Newfoundland Heart

Health Survey

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Introduction

The Newfoundland Heart Health Survey was carried out by the Community Health Branch of the Department of Health, Government of Newfoundland and Labrador in collaboration with the Health Services and Promotion Branch of the Department of National Health and Welfare.

Newfoundland experiences higher death rates from cardiovascular disease than the Canadian average. The main reason for this study was to estimate the prevalence and distribution patterns of cardiovascular disease risk factors, including high blood pressure, elevated blood lipids, smoking and obesity in the province. At the same time, the survey also determined how much the residents of the province knew about those factors in their relationship to heart disease and stroke.

The survey which consisted of a home interview and clinic visit, was conducted by specially trained community health staff (Public Health Nurses, Nutritionists and Health Educators) between November 1988 and March 1989.

Highlights of the Survey Results

Response Rate:

A total of two thousand four hundred and twelve non-institutionalized residents of Newfoundland (males and females) between the ages of 18 and 74 years participated in the survey. Participants were randomly selected from the province's Medical Care Plan File and were representative of both urban and rural areas.

Blood Pressure:

- Overall prevalence of high blood pressure in the province was 21%, equivalent to 79,000 Newfoundlanders and Labradorians.
- Sixty percent (60%) of individuals with high blood pressure were uncontrolled and one in four was unaware of their condition. This occurred despite the fact that 70% of the participants had had their blood pressure checked within the year prior to the survey.
- A large majority of individuals interviewed think that high blood pressure is related to what people eat and drink. Seventy-six percent (76%) recognized salt as a factor while only 8% identified sodium.

Blood Lipids:

- Over 40% of individuals (157,000 in the population ages 18 - 74) had total plasma cholesterol levels above the **desirable** value of 5.2 mmol/L (200 mg/dL).
- About 3 in 10 persons interviewed, (105,000 in the population ages 18 - 74), fell in the **borderline high cholesterol** range of between 5.2 and 6.2 mmol/L (200 to 240 mg/dL).
- One in 7 (52,000 in the population ages 18 - 74), had plasma cholesterol levels equal to or greater than 6.2 mmol/L (240 mg/dL) the range considered **high blood cholesterol.**
- Eighty-eight percent (88%) of those interviewed indicated they had heard about cholesterol, and 94% were aware that cholesterol is found in food. Of these, 95% believed that it can affect health.
- Slightly over 50% of individuals recognized that cholesterol is found in beef and eggs. Less than one in 3 knew that it is present in whole milk and cheese.
- Eighty-six percent (86%) believed that cholesterol is found in the blood. Almost everyone knew that blood cholesterol affects health and 70% knew of its relationship to heart attacks.
- Two-thirds of those interviewed knew that the blood cholesterol level can be lowered by reducing the amount of fatty foods they ate. However, only one in seven recognized the value of low fat dairy products and weight reduction.
- Fat consumption was viewed by a large majority (80%) as affecting health: however, only 40 to 50% of these individuals were aware of the relationship of fat consumption to heart disease and to risk factors for heart disease, such as elevated cholesterol levels and obesity.

Smoking:

- Thirty-five percent (35%) of those interviewed were regular smokers (at least one cigarette every day). This is equivalent to 131,000 individuals in the population ages 18 - 74.
- Unlike other Heart Health studies in both New Brunswick and Nova Scotia, regular cigarette smoking was noticeably higher among younger females than males.
- Among regular cigarette smokers, 17% were heavy smokers (over 25 cigarettes per day) and this was highest among middle aged males.

Alcohol Consumption:

- Forty percent (40%) of individuals said they had one or more drinks per day, and one in six had over twenty drinks per week.
- Males reported drinking more than females for all age and sex groups. The heaviest drinking is highest in the younger age groups and it declines with age.

Weight:

- About 40 % of individuals (154,000 in the population ages 18 - 74) had a weight which may increase the risk of illness and death from a variety of chronic diseases.
- About one in six individuals in the normal weight group was trying to lose weight. This was higher in females in the younger and middle age groups.
- Dieting was the most common method used to lose weight, followed by exercise.

Diabetes:

- Five percent (5%) of the individuals (equivalent to 19,000 in the population ages 18 - 74) reported ever being told they had diabetes. Among the 124 persons in the sample who were aware, 25 reported having been diagnosed prior to age thirty.

Physical Activity:

- Slightly over one half of the individuals interviewed said they exercised at least once a week.
- Females appear to exercise as often as males, but do so less strenuously and the exercise period is of shorter duration.

Combined Risk Factors for Cardiovascular Disease:

- Slightly over two-thirds of Newfoundlanders and Labradorians (255,000 in the population ages 18 - 74) had one or more of the major risk factors for heart disease (high blood pressure, cigarette smoking and elevated blood cholesterol).
- The prevalence of combined risk factors was higher among males than females in the middle age group.
- About one in four individuals (94,000 in the population ages 18 - 74) had two or more of the major risk factors.
- The prevalence of two or more risk factors increased with age but it does not seem to be noticeably higher among males than females.

Awareness of the Causes of Heart Disease:

- About 40 % of individuals recognized obesity and smoking as risk factors for heart disease.
- Less than one third identified elevated blood cholesterol as a cause of heart disease.
- Less than one quarter of those interviewed were aware of diet-related factors such as fats and dietary cholesterol.
- Thirty percent of individuals reported that stress and lack of exercise were causes of heart disease.

Conclusions:

The data from the Newfoundland Heart Health Survey show that risk factors from cardiovascular disease are widespread throughout the population. These major risk factors, namely, high blood pressure, smoking, and elevated blood cholesterol are unhealthy lifestyle characteristics and contribute in a large measure to the high rate of heart disease and stroke in the province.

The distribution and prevalence of these risk factors in the population suggest that any strategy implemented to address the issues of prevention should target the population at large, deal with all the major risk factors involved, and utilize a broad array of approaches.

Specific attention should be paid to those with high blood pressure, elevated blood cholesterol levels, and those whose eating and exercise habits increase their risk for cardiovascular disease.

Cardiovascular disease prevention in this province requires a balanced, two pronged approach - one broadly based for the population at large and the other directed at those who are at high risk. This will require intersectoral coordination and coalition building between government, professional associations, business and industry to bring about healthy policies and environmental changes necessary to deal with the underlying roots of cardiovascular disease in Newfoundland and Labrador.

NEWFOUNDLAND HEART HEALTH

REPORT OF THE

NEWFOUNDLAND HEART HEALTH SURVEY
(1988-89)

Newfoundland Department of Health
and
Department of National Health and Welfare

ST. JOHN'S, APRIL, 1990

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PREFACE

The Newfoundland Heart Health Survey was carried out in 1988-89 by the Community Health Branch of the Department of Health, Government of Newfoundland and Labrador in collaboration with the Health Services and Promotion Branch, Department of National Health and Welfare. The Principal Investigator for the survey was Dr. Kevin Hogan, Assistant Deputy Minister (Community Health), Department of Health.

This report is intended to provide an overview of the main findings of the survey. The results should serve as a basis for discussion at the provincial and national level leading to the development and implementation of strategies to address this major public health issue.

The survey methodology, the results and the conclusions have been reviewed by a Data Interpretation Committee to whom special thanks are due. The composition of the Committee was as follows:

DATA INTERPRETATION COMMITTEE

Dr. Joyce Beare-Rogers	Chief of the Nutrition Research Division, Health Protection Branch, Department of National Health and Welfare, Ottawa, ON.
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CONSULTANTS TO THE DATA INTERPRETATION COMMITTEE

Dr. Philip Connelly	Director of the Core Lipid Laboratory, St. Michael's Hospital, Toronto, ON.
Dr. Mukund Nargundkar	Assistant Director, Special Survey Methods Division, Statistics Canada, Ottawa, ON.

Thanks are due to the Regional Public Health Units and to the Grenfell Regional Health Services whose staff collected the data, (Appendix B). Thanks are also due to the Department of Health computer staff and also to the Public Health Laboratories for the careful and prompt transportation of blood specimens.

Recognition is given to Dr. Mukund Nargundkar, Special Survey Methods Division, Statistics Canada, to the Core Lipid Laboratory, St. Michael's Hospital, and to the research staff of the Division of Community Medicine and Behavioural Sciences at Memorial University most especially to Ms. Alison Edwards who managed all data analysis.

INTRODUCTION

In Canada as in most industrialized countries, non-communicable chronic diseases are the leading cause of premature death and disability. Mortality from cardiovascular disease accounts for 43% of all deaths before age 69 (Statistics Canada 1986).

Newfoundland experiences higher than average death rates from cardiovascular disease than the Canadian average. For the period 1985-87, the adjusted mortality rates for total cardiovascular disease in Newfoundland for males (females) were 16% (21%) above the national average.

Although mortality rates for cardiovascular disease and its major components, ischemic heart disease and stroke, have declined in all regions of Canada since the 1960's, the Atlantic region has experienced the least decline (Nichols et al 1981, 1986).

Epidemiological, clinical and laboratory studies have identified elevated blood cholesterol, smoking and high blood pressure as the main independent risk factors for cardiovascular disease. These factors are either preventable or controllable (Kaplan and Stamler, 1983).

The widespread prevalence of these risk factors in Canada has been documented (Department of National Health and Welfare, 1973, Statistics Canada, 1981; Fitness and Amateur Sport Canada, 1983; Nova Scotia Department of Health and Fitness, 1987; Robitaille et al., 1979).

It is being increasingly recognized that, even at moderate elevations, elevated blood cholesterol and blood pressure

account for a large proportion of premature cardiovascular disease mortality and morbidity (Rose, 1981). The value of an integrated multifactorial approach to prevention has been recommended by a number of national and international agencies and policy groups and agencies (Federal Provincial Working Group on The Prevention and Control of Cardiovascular Disease in Canada, 1987; World Health Organization, 1982, 1985, 1986; European Atherosclerosis Society, 1987; Resolution of the Thirty-Eight World Health Assembly, 1985).

The purpose of the Newfoundland Heart Health Survey was to estimate the prevalence and distribution patterns of cardiovascular disease risk factors, including high blood pressure, abnormal levels of blood lipids, smoking and co-morbid conditions, e.g. obesity. The survey also addressed some aspects of knowledge and awareness on the causes and consequences of cardiovascular disease e.g.: dietary factors.

The survey was carried out by the Community Health Branch of the Department of Health, Government of Newfoundland and Labrador in collaboration with the Health Services and Promotion Branch of the Department of National Health and Welfare. To allow comparability with the data sets of other provinces which are also doing heart health surveys, the study protocol for the Newfoundland Heart Health Survey follows closely the one developed for the Nova Scotia Heart Health Survey (Nova Scotia Department of Health and Fitness, 1987).

The data processing support was provided by the Health Services Research Group in the Division of Community Medicine, Faculty of Medicine, Memorial University, St. John's, Nfld. The statistical sample design was prepared by the Special Survey Methods Division, Statistics Canada. The lipid

analysis of blood samples was carried out at the Core Lipid Laboratory, St. Michael's Hospital, Toronto.

A probability sample of 2,412 residents of the province between ages 18 to 74 was obtained from sixteen urban centres and four Census Districts which, for sampling purposes, were divided into three strata. The survey field operations were carried out between November, 1988 and March, 1989.

The data were collected by community health staff (public health nurses, nutritionists and health educators). The data were gathered at a home interview and at a subsequent visit to a survey clinic (Table 1). The survey staff was supervised by four regional coordinators who were public health nurses. Provincial coordination was provided by a Survey Coordinator and by the Principal Investigator. The questionnaire was field-tested prior to use in the survey.

In addition to documenting the nature and extent of cardiovascular disease risk in the Province, the study demonstrates how the Public Health System, with the support of existing resources can effectively carry out epidemiological research which is necessary to set goals, to plan and to evaluate community interventions. Details of the survey methodology are given in Appendix A.

SURVEY RESULTS

Response Rate

The survey response rates by age and sex and by stratum are given in Tables 2 and 3. Among the 4,882 individuals who were drawn from the Medical Care Plan Files, 66%, or a total of 3,202 were located and invited to participate in the survey. Among these, 75%, or 2,412, completed the home interview and 65%, or 2,079, completed both the interview and the clinic components of the survey.

The response rates at the interview and clinic levels were similar for both sexes in the middle (35 to 64 years of age) and older (65 to 74 years) age groups. In the younger (18 to 34 years) age group the response rates were lower for males (Table 2). There was no appreciable difference in response rates among the three strata (Table 3).

The socio-demographic characteristics of the participants are given in Table 4. Less than one in 3 participants had post-secondary education and one in 10 had elementary education (up to grade 6). Slightly more than one in 2 participants reported either full time or part time employment at the time of the survey.

Blood Pressure

The blood pressure findings are given in Tables 5 to 10. The mean values for both systolic and diastolic blood pressure increase with age in both sexes and tended to be higher in males than in females within the younger and middle age groups (Table 5).

The prevalence of high blood pressure, HBP, is also shown in Table 5. In this report, high blood pressure is defined as diastolic blood pressure equal to or greater than 90 mm Hg and/or being on treatment, whether pharmacological or non-pharmacological (weight control or salt restriction) for the purpose of lowering blood pressure.

Using the above definition the overall prevalence of high blood pressure was 21%, or about 79,000 individuals in the province, ages 18 to 74. In the younger and middle age groups the prevalence was greater in males while in the older age group the prevalence was greater in females.

High blood pressure awareness, treatment and control status is given in Table 6. The criterion used to define "control" is diastolic blood pressure less than 90 mm Hg. By this criterion over 60% of individuals with high blood pressure were uncontrolled and over one in 4 are unaware of their condition.

The vast majority of individuals (96%) have had their blood pressure checked sometime in the past. About 70% had their blood pressure checked within the last year, with apparent lower frequency of measurement in younger males. Health professionals took virtually all measurements, but only about one in 5 individuals reported receiving information in numbers (Table 7).

Among individuals who were told by a health professional that they had HBP, 70% reported that they had been prescribed some treatment. At the time of the home interview, slightly over three in 5 individuals, for whom something had been prescribed, were taking drugs and about one in 4 were not following a treatment regime (Table 8).

The specific treatment advice, reported to have been given, was primarily drug therapy. The most common non-pharmacological measures, reported having been prescribed, were salt restriction (37%) and weight control (32%) (Table 9).

A large majority of individuals appreciate that high blood pressure is related to what people eat and drink. It is worth noting that while 76% recognized salt as a factor, only 8% identified sodium. Alcohol is seen as important by slightly over 50% of individuals (Table 10).

Lipids

The results of the blood lipid analyses are given in Tables 11 to 18. These results are based on lipid values for those participants who reported fasting 8 hours or more which represent 97% of clinic attendees.

Table 11 shows that total plasma cholesterol increased with age. In males, the mean values level off with age, whereas in females they continued to rise. Mean HDL-cholesterol appeared to be slightly higher in females than in males.

Mean LDL-cholesterol values closely parallel total cholesterol, increasing with age in both sexes, being higher in males than in females under age 65 (Table 12).

Mean triglyceride values were higher among males than among females in the younger and middle age groups, of which the reverse was the case in the older group (Table 12).

The following cut-off points (in Tables 13 to 18), which are used to identify the percentage of individuals above or below specified levels of risk, are based on criteria suggested by a number of, generally concordant, expert review panels (The Expert Panel: Canadian Consensus Conference on Cholesterol, 1988; Study Group, European Atherosclerosis Society, 1987; Consensus Development Conference, 1985).

Table 13 shows that over 40% of individuals (157,000 in the population ages 18 to 74) had total plasma cholesterol levels above the "desirable" value of 5.2 mmol/L (200 mg/dL). This prevalence increased with age and was higher among males than among females in the younger and middle age groups. In the older age group, the prevalence was higher among females.

About three in 10 individuals (105,000 in the population ages 18 to 74)) fell in the "borderline-high" cholesterol range, i.e. between 5.2 and 6.2 mmol/L (200 to 240 mg/dL).

One in 7 individuals (52,000 in the population) had plasma cholesterol levels equal to or greater than 6.2 mmol/L (240 mg/dL), the range recognized as "high blood cholesterol". In the middle age group, this prevalence seems to be higher among males than among females, while in the older age group, the contrary seemed to be the case.

About one in 3 individuals (124,000 in the population, ages 18 to 74) had a LDL-cholesterol level above the "desirable" value of 3.4 mmol/L (130 mg/dL), and one in 10 (41,000 in the population) are in the "high risk LDL-cholesterol" range, i.e. equal to or greater than 4.1 mmol/L (160 mg/dL). The distribution of individuals, over different levels of LDL-cholesterol associated with increased coronary heart disease

risk, for different age-sex groups, followed roughly the pattern noted above for plasma cholesterol (Table 14). One in 10 individuals (34,000 in the population, ages 18 to 74) had an HDL-cholesterol under 0.9 mmol/L (35 mg/dL), a level which has been recognized as a major risk factor for coronary heart disease. This prevalence of "low HDL-cholesterol" was higher in males than in females in the younger and middle age groups (Table 15).

The distribution of individuals, with all age-sex groups combined, by various levels of LDL-cholesterol and HDL-cholesterol is shown in Table 16. Forty percent (40% = 100%-60%) of individuals had an LDL or HDL-cholesterol level beyond the desirable levels for these two lipoprotein fractions. About one in 5 individuals (18% = 100%-60%-22%) were within the high risk range, either due to "low HDL-cholesterol" (less than 0.9 mmol//L (35 mg/dL)) or to "high LDL-cholesterol" (4.1 mmol/L (160 mg/dL)) or to both.

Table 17 gives the distribution of individuals, in all the age-sex groups combined, over various levels of total plasma cholesterol and LDL-cholesterol. Among individuals who might be classified in the "borderline-high" plasma cholesterol range, three in 4 (22/29) had LDL-cholesterol above the "desirable" value and one in 10 (3/29) would be classified in the "high risk LDL-cholesterol" group. Among those in the "high blood cholesterol" range, all are above the"desirable" LDL-cholesterol value and about two in 3 (8/11) fall in the "high risk LDL-cholesterol" category.

Table 18 shows the distribution of individuals, with all age-sex groups combined, over various levels of total plasma cholesterol and HDL-cholesterol. Among individuals within the

"desirable" range with respect to total plasma cholesterol, 7% (4/58) also have low HDL-cholesterol.

Knowledge and awareness data on cholesterol are given in Tables 19 to 23 with all age-sex groups combined. The results show that most individuals had heard about cholesterol (88%) and among these, only one in 5 reported having had it measured. Slightly over one-half of these individuals reported having been told what their blood cholesterol level was. Among those who had heard about cholesterol, one in 12 had been told that their cholesterol level was high. For a large majority of these (81%) some treatment was prescribed or advice given, and in about 40% of the cases dietary measures were recommended (Table 19).

A large majority of individuals (94%) were aware that cholesterol is found in food and among these, most believed that it can affect health (95%). Slightly over one-half of the individuals recognized that cholesterol is found in beef and eggs and less than one in 3 realize that it is present in whole milk and cheese (Table 20).

The presence of cholesterol in the blood is recognized by a large percentage of individuals (86%). Virtually everyone is aware that blood cholesterol affects health; about 70% know of its relationship to heart attacks (Table 21).

With respect to measures which a person may take to lower his or her blood cholesterol level, two-thirds identified reduction of fatty foods and over one-half foods with less cholesterol. Only about one in 7 recognized the value of low fat dairy products and of weight reduction (Table 22).

As a related issue, fat consumption was viewed by a large majority of individuals (80%) as affecting health. However, only between 40 to 50% of individuals recognized the relationship of fat consumption to heart disease and to risk factors for heart disease such as elevated blood cholesterol and overweight (Table 23).

Smoking

The prevalence of regular cigarette smoking was 35% (131,000 individuals in the population, ages 18 to 74). The prevalence was higher among females and males in the younger and middle age groups and appeared to be noticeably high among younger females (Table 24).

Among regular cigarette smokers, 17% were heavy smokers (over 25 cigarettes per day). The prevalence of heavy smoking peaked for middle age males and it was considerably higher among males than among females for each age group (Table 25).

Alcohol Consumption

The distribution of alcohol consumption shows that, on the average, about 40% of individuals had one or more drinks per day and that one in 6 had over 20 drinks per week. Males reported drinking more than females for all age-sex groups. The prevalence of heavier drinking seems to be higher in the younger age group and it declines with age (Table 26).

Weight

The Body Mass Index (BMI) is recognized as an appropriate indicator to categorize the weight of individuals with respect to possible health risks (Bray, 1985). The mean values for the BMI by age-sex groups and the frequency distributions over BMI levels are given in Table 27. Higher mean BMI values were observed for middle age males and older females.

Using the Canadian Standard for Healthy Weights (Department of National Health and Welfare, 1988), about 40% of individuals (154,000 in the population, ages 18 to 74) had a weight, which for height, is associated with excess mortality and morbidity from a variety of chronic diseases (BMI equal to or greater than 27). This prevalence appears to be higher among middle age males and older females.

About one in 6 individuals in the normal weight category (BMI under 25) was trying to lose weight, this being much more common for females than for males in the younger and middle age groups. Among overweight individuals, with BMI over 27, less than one in two were trying to lose weight, this also being more common among females than among males (Table 28).

Overall, less than one-third of the individuals, ages 18 to 74, were trying to lose weight. Dieting was the most common measure used to lose weight (87%) followed by exercise (52%). Use of diet pills for weight loss was minimal (Table 29).

Diabetes

Five percent of the individuals reported having been told that they had diabetes (19,000 in the population, ages 18 to 74). Among the 124 individuals in the sample who were aware, 25 reported having been diagnosed prior to age thirty (Table 30).

Physical Activity

Slightly over one-half of the individuals exercised at least once per week. Among these, two-fifths reported that the exercise was strenuous enough to cause shortness of breath, and for two-thirds the duration of the exercise was in excess of 30 minutes. Females appear to exercise about as often as males, but seem to do so less strenuously and the exercise period is of less duration (Table 31).

Combined Risk Factors for Cardiovascular Disease

Table 32 shows the percentage of the population with 0,1,2 or 3 of the major risk factors for cardiovascular disease: smoking, high blood pressure and elevated blood cholesterol. Slightly above two-thirds of Newfoundlanders and Labradorians ages 18 to 74, (255,000 individuals in the population, ages 18 to 74) had one or more risk factors. This prevalence of combined risk factors increased with age; in the middle age group, it was higher among males than among females.

One in 4 individuals had two or more of the major risk factors (94,000 in the population, ages 18 to 74). This prevalence of combined risk factors also increased with age, but it does not seem to be noticeably higher among males than among females.

Information on the public knowledge and awareness of the causal risk factors in the development of heart disease is given in Table 33. About 40% of individuals recognized overweight and smoking as risk factors for heart disease, less than one-third identified elevated blood cholesterol and less than one-quarter mentioned diet-related factors such as fats and dietary cholesterol. Stress and lack of exercise were reported as causes by about 30% of individuals (Table 33).

DISCUSSION OF THE RESULTS

Survey Response

The overall location rate for individuals whose names were drawn from the Medical Care Plan File was less than anticipated, but similar to the one obtained in the Nova Scotia Heart Health Survey (Nova Scotia Department of Health and Fitness, 1987). This is explained by the fact that the Medical Care Plan File was not fully updated. Quite a few individuals had moved from their registered address and had not notified the Plan; individuals who had died or left the Province may not have been deleted from the File, this being more of a problem in the younger age groups.

Since virtually all residents of the Province are registered with the Plan, every resident had some probability of selection under the sampling scheme used. The probability weights were not adjusted for double listings; nevertheless, this is not believed to have had an appreciable effect on the tabular estimates.

The overall response rate for the survey and the response patterns by age-sex groups compare favourably with those observed in similar national and international studies (Department of National Health and Welfare, 1973; Statistics Canada, 1981; Nova Scotia Department of Health and Fitness, 1987; The WHO-MONICA Project). This was largely due to the fact that the community health professionals who conducted the survey, enjoy a high degree of credibility and trust in the community.

To assess the extent to which non-response may have influenced the results, a comparison is made in Table 34 of selected socio-demographic characteristics and health behaviours between clinic attendees and those individuals who participated in the home interview, but did not come to the clinic. This Table shows that those who did not attend the clinic were more likely to be smokers and had lower household earnings. There were no differences between the two groups with respect to the prevalence of high blood pressure, sedentary lifestyle and level of education (post-secondary).

The difference observed with respect to smoking prevalence and income confirms a similar observation reported by the Nova Scotia Heart Health Survey (Nova Scotia Department of Health and Fitness, 1987). This suggests that individuals who do not attend the clinic are more likely to have cardiovascular disease risk factors. For this reason, the prevalence estimates of risk reported here may, in fact, be under-estimates of the actual prevalence of risk factors in the population.

High Blood Pressure

In this survey the presence of high blood pressure is defined as: (1) a diastolic blood pressure equal to or greater than 90 mm Hg (the mean of four measurements made at two separate visits) and/or (2) being on medication and/or salt restriction and/or weight reduction for the treatment of high blood pressure.

It is worth pointing out that the Newfoundland Heart Health Survey gives more reliable estimates of high blood pressure than other surveys where blood pressure was measured at one

visit only (Department of National Health and Welfare, 1973, 1989; Statistics Canada and Department of National Health and Welfare, 1981; Fitness and Amateur Sport Canada, 1983).

From a clinical perspective, a diastolic blood pressure reading falling into the lower end of the range "90 mm Hg and over" does not necessarily imply that an individual would be labelled hypertensive or that drug treatment is indicated. Longitudinal studies, have shown however, that blood pressure measurement on only one occasion can predict the occurrence of high blood pressure (Rabkin et al., 1982; Robitaille et al.,1983), cardiovascular disease (Pooling Project Research Group, 1978) and death from any cause (Johansen et al., 1987) years later.

Thus, the criteria used in this report to define HBP is judged to be appropriate for public health purposes in identifying the increased population risk of cardiovascular disease due to elevated blood pressure (Blackburn et al., 1985; Nova Scotia Department of Health and Fitness, 1987; Department of National Health and Welfare, 1989).

The prevalence of high blood pressure in Newfoundland is similar to that reported in the Nova Scotia Heart Health Survey (Nova Scotia Department of Health, 1987) and in the Canadian Blood Pressure Survey (Department of National Health and Welfare, 1989).

The prevalence of high blood pressure is higher in the oldest age group, where issues of compliance and the risks and benefits of treatment are still uncertain (Larochelle et al., 1986). Although the prevalence in the younger age group is

much lower, non-compliance with treatment is likely to be more of a problem than with other age groups; thus, the young should not be neglected as a target for education.

It is of concern that among individuals with high blood pressure, 60% are not controlled, that almost 30% are treated but not controlled and that over one in 4 are unaware of their condition. This is despite the fact that 70% of Newfoundlanders and Labradorians had their blood pressure checked within the year prior to the survey.

There is an indication, however, that both the uncontrolled rate among individuals with high blood pressure (63%) and the uncontrolled rate among individuals being treated for high blood pressure (43%) [=100x28/(37+28)] may be higher in Newfoundland than in Nova Scotia, where the respective rates were (45%) and (19%) [=100x13/(13+55)]. The reason for this difference is not clear and would seem to merit further investigation.

These findings suggest that the management and/or compliance with prescribed regimes is far from optimal. This is supported by the finding that among individuals who had been told that they had high blood pressure and had been prescribed a treatment or program, an appreciable proportion of them were not following the treatment or program at the time of the survey.

Underlying factors to the lack of control of high blood pressure appear to be the inappropriate information given to patients concerning their blood pressure and the relative infrequent use of non-pharmacological approaches to management of the condition.

Lipids

According to recent scientific consensus conferences, the presence of high total blood cholesterol, high LDL-cholesterol or low HDL-cholesterol is strongly associated with the development of atherosclerosis in humans and warrants remedial action (The Expert Panel: The Canadian Consensus Conference on Cholesterol, 1988; The Expert Panel: National Cholesterol Education Program 1988; European Atherosclerosis Society, 1987; The British Cardiac Society Working Group on Coronary Prevention, 1987; Consensus Development Conference, 1985). The data from the Newfoundland Heart Health Survey permit an assessment of the population risk in terms of these different lipid fractions and their combinations.

The Canadian Consensus Conference on Cholesterol (1988) recommended as a goal the achievement of a blood cholesterol mean level of 4.9 mmol/L (190 mg/dL) in the general population. By this criterion, the data from the Newfoundland Heart Health Survey indicate that, for middle age and older groups, a reduction of about 10% in the mean blood cholesterol level from current levels would apply.

MacMahon and Peto (1988) have estimated, from a review of intervention trials, that such a reduction in the mean blood cholesterol level should result in a reduction of between 10 to 30% in total coronary heart disease. The feasibility of achieving this goal in Canada has been examined by Little and Horlick (1989) who conclude that the estimated reduction in coronary heart disease would be even greater, particularly if accompanied by the reduction and control of other risk factors such as smoking and high blood pressure.

LDL-cholesterol is recognized as the major atherogenic fraction (Grundy, 1986; Brown and Goldstein, 1986). However, for purposes of case-finding and initial evaluation in practical settings, analysis of total blood cholesterol is more readily available. The latter is a good proxy for risk since total blood cholesterol is closely correlated with LDL-cholesterol by virtue of the fact that about 70% of the cholesterol in the plasma is found in LDL-cholesterol.

There are an estimated 157,000 Newfoundlanders and Labradorians at appreciably increased risk [above 5.2 mmol/L (200 mg/dL)] due to elevated plasma cholesterol and most would likely benefit from having it reduced. Among these 52,000 are at high risk [above 6.2 mmol/L (240 mg/dL)] and may require some form of medical intervention.

The overall prevalence of elevated plasma cholesterol, LDL-cholesterol, and HDL-cholesterol over various levels of risk reported here, matches quite closely that observed in the Nova Scotia Heart Health Survey (MacLean and Petrasovits, 1988).

Clinical trials have shown that lowering LDL-cholesterol in men with high levels decreases the incidence of coronary heart disease (Mishkel, 1989; Langille and Lavigne, 1988). In terms of this fraction some 124,000 adults may be considered to be above "desirable" levels [equal to or greater than 3.4 mmol/L (130 mg/dL)] and 41,000 are in the "high risk LDL-cholesterol" range [equal to or greater than 4.1 mmol/L (160 mg/dL)].

A low HDL-cholesterol concentration, defined as a level below 0.9 mmol/L (35 mg/dL) is associated with a significant increase in coronary risk in both men and women (Gordon et al.,1977; Goldbourt and Medalie, 1979). By this criterion,

there are about 34,000 individuals in the adult population at risk due to "low HDL-cholesterol". Hygienic means (e.g. smoking cessation, aerobic exercise, weight loss) have been recommended to raise low HDL-cholesterol levels; however, drug therapy specifically to raise HDL-cholesterol in patients without high blood cholesterol levels is not advocated (Grundy et al., 1989).

The higher prevalence, among men, of risk levels for total plasma cholesterol and the lipoprotein fractions LDL and HDL-cholesterol, together with evidence from epidemiological intervention studies and recommendations from review panels suggest that middle age men would constitute a priority for intervention (The Expert Panel Report of the National Cholesterol Education Program, 1988; Toronto Working Group on Cholesterol Policy, 1989).

The statistical cross tabulations of prevalence between different lipid fractions (Table 17,18) have implications for the definition of practical guidelines for testing and for establishing guidelines for detection and evaluation, after a total plasma cholesterol value has been obtained. In particular, the data show the value of determining the LDL and HDL-cholesterol following determination of total plasma cholesterol. Considering the usefulness of measuring LDL and HDL-cholesterol in individuals who were found to have a high risk total cholesterol greater than 6.2 mmol/L (249 mg/dL), note that all (11/11) had an elevated LDL-cholesterol [above 3.4 mmol/L (130 mg/dL)] and 14% (2/14) also had a low HDL-cholesterol, [less than 0.9 mmol/L (35 mg/dL)]. Therefore, there appears to be limited benefit to be gained by measuring LDL and HDL-cholesterol in these individuals (Tables 17,18).

However, in the medium risk range for total plasma cholesterol [between 5.2 and 6.2 mmol/L (200 mg/dL to 240 mg/dL)], 24% (7/29) of individuals had a normal LDL-cholesterol [less than 3.4 mmol/L (130 mg/dL)] and 89% (25/28) had an HDL-cholesterol greater than 0.9 mmol/L (35 mg/dL). This suggests that, among these individuals, it is worth measuring LDL and HDL-cholesterol as a means of avoiding their entry into a preventive program (Tables 17,18).

Among individuals with a normal total plasma cholesterol level of less than 5.2 mmol/L (200 mg/dL), 5% (3/60) had an above normal LDL-cholesterol [equal to or greater than 3.4 mmol/L (130 mg/dL)] and 7% (4/58) had a high risk HDL-cholesterol [less than 0.9 mmol/L (35 mg/dL)]. This would indicate some benefit of measuring LDL-cholesterol and HDL-cholesterol in this group of individuals with normal total plasma cholesterol, particularly if other risk factors were present (Tables 17,18).

If studies conducted in the U.S. are a guide to the Canadian situation, bringing about control of individuals at high risk from elevated blood cholesterol will require addressing the lack of awareness on the part of physicians of the importance of blood cholesterol as a risk factor, and the apparent lack of action to manage it at levels associated with moderate risk (Shucker et al., 1987a, 1987b).

Most individuals are aware of the existence of cholesterol and that it may have an impact on health; however, specific knowledge of its link to diet and specific health outcomes is lacking. Although there are many factors which can influence blood cholesterol, in most individuals with moderate elevations, diet is the most overriding one (Blackburn, 1979).

This would suggest the need for public education programs which speak directly to the need of reducing total and saturated fat intake, as well as practical guidance for individuals on how to achieve it.

Large numbers of individuals are implicated as being at increased risk for heart disease according to current consensus guidelines. Recent estimates prepared by the U.S. National Centre for Health Statistics indicate that, using the National Education Cholesterol Program guidelines for Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (The Expert Panel, 1988) about 40 million Americans between the ages of 20 and 59 years are candidates for medical advice and intervention (Sempos et al., 1989).

The definition of priority high risk groups for case-finding, evaluation and treatment is a much debated health policy issue. There is a growing, and justified, concern that identification of large numbers of individuals as being at risk, coupled with availability of new therapies and the lack of reliability of routine laboratory lipid measurements, could lead to overmedicalization and add to the health care costs without yielding significant benefit to the health status of the population (Toronto Working Group on Cholesterol Policy, 1989). Care is needed to avoid the potentially harmful consequences of labelling individuals at risk or causing undue anxiety through inappropriate programs of public information or of detection of persons at high risk (Haynes et al., 1978; Wagner et al., 1984).

Undue medicalization may, in part, be averted through appropriate professional and patient education programs, cautious treatment guidelines for the use of drugs and by

health professionals making more use, when appropriate, of non-pharmacological approaches as sole or adjuvant means to control risk factors such as elevated blood pressure and blood cholesterol (Consensus Conference on the Non-Pharmacological Management of High Blood Pressure, 1988; The Expert Panel: Canadian Consensus Conference on Cholesterol, 1988; Little and Horlick, 1989).

In addressing the above concerns, it is important to keep in perspective that the identification of a large segment of the population as being at risk need not, per se, result in undue impact on health care costs, since for the majority of these individuals, little more would be required than reinforcing the hygienic, general population, health-promotion-type of approach (European Atherosclerosis Society, 1987).

Smoking

Due to its widespread prevalence, smoking makes a major contribution to cardiovascular disease mortality, as well as to other chronic diseases (e.g. lung cancer, chronic obstructive pulmonary disease).

Smoking rates in Newfoundland are slightly higher than the National average (Department of National Health and Welfare, 1988a). Of special significance is the high prevalence of smoking among females in the younger age group. Among regular smokers it is worth pointing out the high prevalence of heavy smokers among young and middle age males. Clearly, there is a need for effective programs to prevent smoking and to promote smoking cessation, particularly among the young.

Alcohol

Alcohol is being increasingly recognized as a significant factor for high blood pressure, even at moderate levels of consumption (Beilin et al., 1987). Although the reliability of estimating alcohol consumption through interviews may be open to question, the data from this survey suggest that a sizeable proportion of individuals are consuming alcohol at a level that is not consistent with good cardiovascular health.

Weight

There is some controversy as to whether overweight is an independent risk factor for coronary heart disease. However, its role in the expression of high blood pressure, diabetes, hypercholesterolemia and in the development of other chronic conditions, such as osteo-arthritis, is well recognized (Bray, 1985; Roncari, 1983). There is evidence that overweight as a risk factor is the more significant the earlier in life it occurs (Rabkin, 1977).

The prevalence of overweight in Newfoundland is widespread, especially among middle age males and older females. Clearly females are more conscious about weight control than males. It is of particular concern that, among young and middle age females, who are of normal weight, one in 4 is trying to lose weight. Males appear to be less concerned with weight control as evidenced by the fact that less than 40% of those who are obese are trying to control their weight. This suggests the need to make the public aware of what constitutes a healthy weight without creating undue anxiety among individuals (Department of National Health and Welfare, 1988c).

With respect to measures currently used to lose weight, it is advisable for education programs to emphasize appropriate dietary habits (e.g. not skipping meals) and the value of exercise. Weight control programs do not seem to be utilized to any great extent. There would seem to be opportunities for self-help and mutual aid groups to assist individuals to understand what a healthy weight is and how to obtain it.

Diabetes

Diabetes has been shown to be an independent risk factor for heart disease and that it is especially significant for women after middle age (Kannel and McGee, 1979).

The prevalence of awareness of this condition in this survey is similar to that reported in other studies (Statistics Canada and Department of National Health and Welfare, 1981). It is believed that there is a sizeable percentage of diabetics who are not aware of their condition; thus the prevalence reported here is, in all likelihood an underestimate of the true prevalence (Wigle, 1986). The small number of individuals in the sample, aware of their diabetic status, does not lend itself to a breakdown by age-sex. It is known, however, that the prevalence increases with age and thus it can be presumed that awareness and control programs targeting the middle age and older groups should be a priority.

Physical Activity

There is evidence that vigorous physical activity is a preventive factor for heart disease (Paffenbarger et al., 1978). Exercise helps to control other risk factors (e.g. weight) and it should be beneficial for overall health.

The instrument used in this survey did not allow the estimation of the percentage of individuals who exercise vigorously, i.e. in a manner that would benefit their cardiovascular health. However, the data provide a valid estimate of the proportion of the population which is sedentary and that would benefit from appropriate health promotion activities.

A large segment of the population in Newfoundland leads a sedentary lifestyle. This is consistent with data from the Canadian Fitness Survey (Stephens et al., 1986). Programs which incorporate measures aimed at increasing the physical activity of Newfoundlanders and Labradorians are warranted.

Combined Risk Factors

It is well recognized that significant elevation of any one of the major cardiovascular disease risk factors can pose a risk to health. For example, the risk of heart attack within a seven-year period for middle age men with a plasma cholesterol of 6.2 mmol/L (240 mg/dL) is doubled, in comparison to the risk for middle age men with plasma cholesterol of 5.2 mmol/L (200 mg/dL). However, it is less well appreciated that combined moderate elevations of several risk factors may also confer a significant increase of coronary heart disease risk. For example, cigarette smoking about doubles the risk for heart disease at all levels of plasma cholesterol (Stamler, 1986).

In Newfoundland, over 255,000 individuals have one or more of the major cardiovascular disease risk factors. This is generally consistent with the estimates obtained in other risk factor surveys where the combined prevalence of risk factors

was estimated (Department of National Health and Welfare, 1989). It is worth noting however, that the combined risk factor prevalence (one or more of the major risk factors) in Newfoundland is lower that reported in the Nova Scotia Heart Health Survey (Nova Scotia Department of Health and Fitness, 1987).

These documents clearly demonstrate that cardiovascular disease risk is widespread in the population. The survey data also point to important gaps in public knowledge and awareness. Thus these findings would suggest that a multifactorial, integrated health promotion approach is required.

CONCLUSIONS

The data from the Newfoundland Heart Health Survey raise a wide range of issues that need to be addressed. The widespread prevalence of risk factors for cardiovascular disease strongly suggests that the high rate of heart disease and stroke in the province is due, in a large measure, to unhealthy characteristics of average living. Consequently, any strategy implemented to address the issue of prevention should target the population at large, deal with all the major risk factors involved and utilize a broad array of approaches.

The potential impact on health care costs of providing medical interventions to the large number of individuals with elevated blood cholesterol levels should stimulate the development of effective population approaches. The goal of these should be to reduce blood cholesterol levels of most Canadians in a context that addresses other cardiovascular risk factors.

Of paramount importance is the need for an effective dietary strategy to implement the existing Nutrition Recommendations for Canadians (Department of National Health and Welfare, 1977; Beare-Rogers, 1984) and the revised version that is in the process of being prepared by the Department of National Health and Welfare (Beare-Rogers, Personal Communication). Overweight is also a related issue that requires attention in the context of a dietary strategy for enhancing heart health.

Judicious planning, implementation and evaluation of programs to address these dietary issues, require a valid data base on the nutritional practices and status of Newfoundlanders and Labradorians. The Nutrition Canada Survey was carried out in 1972. There is a need for fresh data.

Many residents of the Province are at high risk for one or more disease risk factors and would benefit from medical intervention. The data presented here indicate that the identification and the management of individuals is far from optimal. This is the case with respect to the large number of individuals with uncontrolled high blood pressure, highly elevated blood cholesterol and with multiple risk factors. There is an opportunity for increased use of non-pharmacological approaches to the management of individuals at risk.

There is a need for an organized, systematic approach to enhance the preventive practices of health professionals. This would include cooperative, interdisciplinary programs to enable prevention through primary care practice as well as approaches to link the primary care sector with the public health system and health promotion community initiatives.

It follows from the above that a comprehensive strategy to address cardiovascular disease prevention in Newfoundland, requires a balanced, two-pronged approach. On the one hand, comprehensive, multifactorial programs targeted to the population at large are clearly indicated since most residents of the Province are at some risk. On the other hand, there is the additional requirement to detect and provide medical intervention for the smaller proportion of the population that are at high risk.

The data from the Newfoundland Heart Health Survey may be used to further characterize groups at risk and determine cost-effective approaches of alternative interventions. A key priority is the analysis of the data by socio-economic status,

in view of fact that cardiovascular disease (Wigle and Mao, 1980) and its attendant risk factors (Millar and Wigle, 1986) are known to cluster in disadvantaged groups.

Comprehensive public health measures are required to implement the above strategies. Emphasis on intersectoral coordination and coalition building between government, professional associations, community health agencies, business and industry and researches is of the essence to bring about healthy policies and environmental change necessary to deal with the underlying roots of cardiovascular disease in Newfoundland.

APPENDIX A: METHODOLOGY

Population

The target population for the survey was the non-institutionalized, adult population of Newfoundland (ages 18 to 74), with the exclusion of residents of coastal Labrador, those living in Indian Reserves, institutions (e.g.: prisons, hospitals) and military camps. The province of Newfoundland has a total population of 568,000, of which 374,800 are 18 to 74 years of age (Statistics Canada, 1988). The unemployment rate in Newfoundland is appreciably higher than the national average and it is subject to seasonal fluctuations.The economy of the province is resource based, consisting primarily of fishing, logging and mining.

Sampling Frame

The sampling frame was the computerized list of residents of the province enroled in the Medical Care Plan File (MCPF). Medical care is universally available in the Province and practically all residents are registered with the Medical Care Plan. The MCPF was established in 1969 with the introduction of universal medicare in the province. Each individual record has a unique identifier with name, age, sex and address. Individuals may be entered in the MCPF at birth.

Sample Selection

The Province has 16 urban centres ranging in population from 5,000 to 100,000 in the City of St. John's. For purposes of the sampling design, the province was divided into three strata. Stratum I consisted of the six largest urban centre and Stratum II was made up of 10 smaller urban centres. Stratum III consisted of the Census Divisions of the province with the exclusion of those corresponding to urban centres in strata I and II.

The sample was selected in two stages. In stage one, all urban centres from Stratum I were selected. From Stratum II two replicates of two urban centres each were selected with probability proportional to size. From Stratum III two replicates of two Census Divisions each were selected with probability proportional to size; size being defined as the population of the areas.

The standard geographic identifications for the Newfoundland residents were not available on the MCPF and, therefore, the population in the selected areas could not be grouped into the six age-sex groups for sampling purposes. To overcome this difficulty, in the second sampling stage, all persons in Newfoundland were stratified into six-age groups. The sampling ratio (interval) for each age-sex group was calculated using the age-sex distribution in the selected areas from the 1986 Census data. This was to ensure that a large enough sample from each group was selected to give the number of expected responses required in each selected area and age-sex group.

In calculating sampling ratios, consideration was also given to the out-of-dateness of the register and to the possible non-response to the survey. Using these sampling ratios and random starts, persons from the six age-sex groups were selected. From among these selected persons, those that fell in the selected areas constituted the sample for the survey. Identification of persons within the selected areas was done manually using their addresses from the register.

The target sample size was 2,000 individuals. To accommodate failure-to-locate and non-response, a total sample of 4,882 individuals in the age-sex groups and areas required was drawn from the MCPF. Of these, 3,202 individuals were located and invited to participate in the survey.

The larger sample allocation for the younger age groups (Table 2) was to obtain an even distribution of individuals expected to fall into the high risk group categories (e.g. high blood pressure and elevated blood cholesterol) among age-sex groups. This pattern of allocation tends to yield higher precision for the prevalence estimates in the younger age groups which might constitute a priority for intervention.

Staff Training

Public health nurses, nutritionists and health educators were involved in data collection. Staff attended a two-day training session on, measurement of height, weight, blood pressure and drawing of blood specimens. A manual for interviewing was developed by Statistics Canada and used as a basis for training in administering the questionnaire. The training also dealt with the survey data flow and quality control in all in all phases of data capture.

Blood Pressure

The survey staff was trained for the measurement of blood pressure using a video-tape developed by Dr. George Fodor, Faculty of Medicine, Memorial University of Newfoundland, following the guidelines of the Canadian Coalition for High Blood Pressure, (1988). Standardization for identification of the Korotkoff sounds was carried out using the procedure of the Lipid Research Clinics Program (National Institutes of Health, 1984). Standard mercury sphygmomanometers, 15-inch stethoscopes and appropriate size cuffs were used. The subject rested quietly for a minimum of five minutes and had been asked not to eat or smoke for a minimum of 30 minutes prior to measurement. The participant's right arm was held at the level of the heart. The maximum inflation level was determined prior to the actual measurement of blood pressure. The first and fifth Korotkoff sounds were recorded for the systolic and diastolic pressures respectively. For sounds which continued to zero mm Hg the fourth Korotkoff sound was recorded. The pulse was also recorded.

Four blood pressure readings were taken at the beginning and end of the home interview and at the beginning and end of the clinic visit. The blood pressure data presented in this report are based on the mean of these four measurements.

Height and Weight

Weight was measured using clinic scales. Participants were dressed in normal indoor clothing without shoes. Height was measured against a wall using a walled tape measure, with

participants standing without shoes on a hard surface. For purposes of this report, the height and weight data were converted to Body Mass Index values [weight(Kg.)/height (m) squared)].

Blood Samples

Participants were asked to fast for 12 hours. At the clinic, the time actually fasted was recorded. A venous blood sample was obtained in a 10 ml Lavender stopper Vacutainer tube containing sodium EDTA. The filled tube was promptly mixed by inverting it eight times. The tube was labelled and stored at 4 degrees C pending centrifugation which was done within four hours of the taking of the blood specimen. The plasma was transferred to Bijou bottles by Pasteur pipettes and shipped on ice-packs for lipid analysis to the Core Laboratory, Lipid Research Clinic at the University of Toronto. This laboratory is standardized to the Lipid Research Clinics methodology.

The lipid fractions determined were: total plasma cholesterol, triglycerides, high density lipoprotein cholesterol (HDL) and low density lipoprotein cholesterol (LDL). The lipid determinations were made according to the Lipid Research Clinics Laboratory manual and met the requirements for standardization and quality control described elsewhere (National Heart, Blood and Lung Institute, 1974). The plasma samples were not examined for lipemia.

Quality Control

The regional coordinators visited the clinics periodically to monitor adherence to survey procedures. For every fiftieth participant at the clinic, blood pressure and height and weight measurements were repeated by the coordinators to verify the information obtained by the survey staff. A duplicate blood sample was taken from every fiftieth participant to allow an independent quality control check of the analyses done at the Core Laboratory.

Ethical Provisions

To ensure confidentiality each participant was given a unique identifier which precluded the need to have name and address on the survey instruments. A separate file was established to link name and address to the identifier for purposes of control of survey information and for referral to care services if necessary. Responsibility for the custody of this file and other survey information rested with the Principal Investigator, Department of Health.

All participants were given a card with their blood pressure measurements. Those with diastolic blood pressure above 90 mm Hg were advised to see a doctor according to the Referral Guidelines of the Canadian Hypertension Society and of the Canadian Coalition for High Blood Pressure. (Canadian Coalition for High Blood Pressure, 1988).

Each participant was sent a letter with the blood lipid results and an explanation of their significance. Those with plasma cholesterol level above 5.2 mmol/L (200 mg/dl) were advised to see their physician.

The survey protocol was submitted and approved by the Ethical Review Committee of the Faculty of Medicine, Memorial University of Newfoundland.

Data Processing

The home interview and the clinic data were edited by the regional coordinators and forwarded to the survey coordinator who verified the completeness of the data. The data were then sent to the Data Processing Section of the Health Services Research Group Division of Community Medicine and Behavioural Sciences, Memorial University of Newfoundland. The section consolidated the information from the home interview, the clinic and the results from the laboratory analysis in a computerized master file.

To keep track of the interview and clinic data sets and to ensure completeness of data collection, control ledgers were independently kept by the regional coordinators and by the survey coordinator.

The Data Processing Section of the Health Services Research Group checked the data for inconsistencies and missing items. The inconsistencies were rectified and whenever possible the missing data were collected by recontacting the participants or by agreed upon rules of imputation. Missing values for blood pressure were imputed using the mean of available measurements for the participant. Responses to knowledge and awareness questions were not imputed.

Probability weights, which are the inverse of the probabilities of inclusion of respondents in the sample, were calculated from the sample design and added to the computer master file. Separate weights were used for information collected at the home interview and for information collected at the clinic. Non-response to the home interview or to the clinic was accommodated by adjusting the probability weights of the respondents. Unless otherwise stated, all the tabular estimates presented in this report are weighted.

APPENDIX B: SURVEY STAFF

Provincial

Provincial Investigator	Dr. K. Hogan
Survey Coordinator	Ms. E. Swanson
Secretarial Support	Cindy Tucker
Data Support	Cathy Dalton
	Sophia Collier

Western Region

Coordinator	Elizabeth Condon
	Susan Gillam
Public Health Nurses	Florence Newman
	Jane Wellman
Secretarial Support	Carol Matthews

Central Region

Coordinator	Judy Button
Public Health Nurses	Sandra Collier
	Patricia Matthews
	Marilyn MacGillvary
	Joan Blackmore
	Lorraine Bambury
	Louise Price
	Marilyn Barnes
Nutritionist	Isabelle Hall
Nursing Student	Juanita Cooper

Eastern Region

Coordinator	Trudy Bussey
Public Health Nurses	Diane Eveleigh
	Cindy Smith
	Carolyn Hiscock
	Rosalind Philpott

St. John's & District Region

Coordinator	Judy Blakely
	Linda Carter
Public Health Nurses	Angela Standage
	Marilyn Holloway
	Judy Pittman
	Glenda Dempson
	Moira O'Regan Hogan
	Cindy McDonald
	Juanita Hudson

Grenfell Region Health Services

Public Health Nurses	Kirtida Acharya
	Evelyn Jubber

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TABLE 1

DATA GATHERED AT THE HOME INTERVIEW

AND AT THE CLINIC VISIT

I. HOME INTERVIEW

A. Individual and household demographic data

B. Knowledge and awareness of:

1. High blood pressure
2. Cholesterol
3. Dietary factors (fat, salt)
4. Heart disease and stroke

C. Health Behaviours:

1. Smoking
2. Alcohol consumption
3. Physical activity
4. Compliance with prescribed treatment for high blood pressure and elevated blood cholesterol

D. Two blood pressure measurements

II. CLINIC VISIT

A. Two blood pressure measurements

B. Height and weight

C. Fasting blood sample

TABLE 2

NUMBER IN THE POPULATION, SAMPLE

DRAWN FROM FILE AND RESPONSE BY AGE AND SEX

	Male			Female			TOTAL
	18-34	35-64	65-74	18-34	35-64	65-74	
Number in Population (a)	82300	88100	15700	84700	87000	17000	374800
Number drawn from file (b)	1381	803	253	1387	820	238	4882
Number located (c)	883	564	210	812	545	188	3202
Home interview completed							
No.	627	428	154	643	422	137	2411
% (d)	71	76	73	79	77	73	75
Home interview and clinic visit completed							
No.	507	384	137	556	376	119	2079
% (e)	57	68	65	68	69	63	65

(a) Postcensal annual estimates of population June 1, 1988. Statistics Canada (Cat No. 91-210).

(b) Total number of names drawn from the NF MCP data files.

(c) Total number of individuals who were located using information from the NF MCP data files and were invited to participate in the NHHS.

(d) Percentage who completed the home interview among those located.

(e) Percentage who completed the home interview and clinic among those located.

TABLE 3

NUMBER LOCATED AND

RESPONSE BY AREA

Located		Home Interview Completed		Home Interview and Clinic Completed	
	Number	Number	%	Number	%
Stratum I					
St. John's	1326	950	72	799	60
Corner Brook	194	142	73	132	68
Labrador City & Wabush	97	85	88	66	68
Stephenville	82	63	77	57	70
Windsor	50	47	94	40	80
Carbonear	82	51	62	43	52
Stratum II					
Wabana	65	54	83	43	66
Channel Port	62	55	89	48	77
Happy Valley	77	57	74	55	71
Gander	90	71	79	65	72
Stratum III					
Division 1	765	596	78	506	66
Division 3	153	108	71	103	67
Division 5	159	132	83	122	77
Total	3202	2411	75	2079	65

TABLE 4

SOCIODEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS IN THE HOME INTERVIEW [a] [b]

	Percent %
Education: [c]	
Elementary	9
Secondary	63
Post Secondary	28
Total	100
Employment Status:	
Full time	45
Part time	9
Unemployed/laid off	13
Retired	9
Homemaker	16
Student	7
Other	1
Total	100

[a] Unweighted data.

[b] Total No. in the sample: 2407.

[c] Education: elementary = grades 0 - 6
secondary = grades 7 - 12
post secondary = grades >12

TABLE 5

MEAN VALUES OF BLOOD PRESSURE [a]

AND PREVALENCE OF HIGH BLOOD PRESSURE [b]

BY AGE AND SEX

	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
Systolic B.P. Mean (mmHg)	125	133	145	115	126	149	-
Diastolic B.P. Mean (mmHg)	78	84	82	72	79	80	-
Prevalence of HBP %	9	31	47	3	27	54	21

(a) Based on the mean of four blood pressure (B.P.) measurements obtained at two separate visits.

(b) High Blood Pressure (HBP) is defined as diastolic B.P. $\geq$90 mmHg and/or on treatment (pharmacological or non-pharmacological: weight control and/or salt restriction).

TABLE 6

PREVALENCE OF HIGH BLOOD PRESSURE AWARENESS TREATMENT AND CONTROL STATUS [a]

(ALL AGE AND SEX GROUPS COMBINED)

Status Prevalence	%
Aware	
Treated and controlled [b]	37
Treated and not controlled [c]	28
Not treated and not controlled [d]	7
Not aware [e]	28
Total [f]	100

(a) The group of individuals distributed across the categories in the table have either been told that they have HBP or were found to have HBP (DBP ≥90 mm Hg) on measurement; excluded are those who were told that they had HBP but were not on treatment and had DBP <90 mmHg.

(b) Individuals who were told that they had HBP and were treated and have DBP <90 mmHg.

(c) Ditto as (b) with DBP ≥90 mmHg.

(d) Individuals who were told that they had HBP and were not treated and have DBP ≥90 mmHg.

(e) Individuals who were never told they had HBP and have DBP ≥90 mmHg.

(f) Total No. in the sample: 477.

TABLE 7

PERCENT RESPONSES TO QUESTIONS ON BLOOD PRESSURE MEASUREMENT BY AGE AND SEX

	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
Ever had B.P. checked	91	99	97	95	99	100	96
Had B.P. checked within last year [a]	54	72	81	67	74	92	69
B.P. was checked: ([a])							
by doctor	61	69	75	73	73	84	70
by nurse	30	27	24	23	23	14	25
Actual value of B.P. measurement provided [a]	21	22	22	20	21	21	21

[a] Among those individuals who reported having their B.P. ever checked (Total No. in the sample: 2335).

TABLE 8

PERCENT RESPONSES TO QUESTIONS

ON TREATMENT FOR HIGH BLOOD PRESSURE

(ALL AGE AND SEX GROUPS COMBINED)

	Percent %
Ever told by health professional that they have HBP	23
Any treatment or program prescribed [a]	70
Currently not following a treatment or program [b]	23
Currently taking drugs [b]	63

(a) Among those individuals who were ever told that they had HBP (Total No. in the sample: 555).

(b) Among those individuals who were ever told that they had HBP and for whom something was prescribed (Total No. in the sample: 380).

TABLE 9

SPECIFIC ADVICE GIVEN TO THOSE WITH HIGH BLOOD PRESSURE FOR WHOM TREATMENT OR PROGRAM WAS PRESCRIBED [a] [b] [c]

(ALL AGE AND SEX GROUPS COMBINED)

Advice	Percent %
Take drugs only	37
Drugs and other treatment	43
Salt free diet	37
Watch the weight	32
Avoid stress	12
Start exercise program	3
Cut down on alcohol	2

(a) Total No. in the sample: 367.

(b) Excluding responses 'to cut down or stop smoking' and the residual category 'other'.

(c) Unprompted responses, more than one response allowed.

TABLE 10

PERCENT AWARE OF DIETARY FACTORS RELATED

TO HIGH BLOOD PRESSURE [a] [b]

(ALL AGE AND SEX GROUPS COMBINED)

Factor	Percent %
Salt/salty foods	76
Alcohol	54
Fats	38
Fried foods	29
Sugar/sweet foods	19
Cholesterol	17
Eating too much	15
Sodium	8
Coffee/caffeine	6
Meats generally	4
Saturated Fats	4
Specific meat other than pork	4
Pork	4

(a) Among those who said that HBP is related to what people eat or drink (Total No. in the sample: 2198).

(b) Unprompted responses, more than one response allowed.

TABLE 11

MEAN VALUES FOR TOTAL PLASMA CHOLESTEROL

AND HDL CHOLESTEROL BY AGE AND SEX [a]

	Male			Female		
	18-34	35-64	65-74	18-34	35-64	65-74
Total Plasma Cholesterol						
Mean mmol/L	4.8	5.5	5.5	4.6	5.3	5.7
[mg/dL]	[185]	[211]	[211]	[179]	[204]	[221]
(Number in the sample)	(498)	(369)	(132)	(539)	(369)	(118)
HDL - Cholesterol						
Mean mmol/L	1.2	1.2	1.2	1.3	1.3	1.3
[mg/dL]	[46]	[45]	[46]	[50]	[51]	[49]
(Number in the sample)	(497)	(368)	(131)	(539)	(369)	(118)

(a) Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more.

TABLE 12

MEAN VALUES FOR LDL CHOLESTEROL AND TRIGLYCERIDES BY AGE AND SEX [a]

	Male			Female		
	18-34	35-64	65-74	18-34	35-64	65-74
LDL - Cholesterol						
Mean mmol/L	2.9	3.4	3.4	2.7	3.3	3.5
[mg/dL]	[112]	[131]	[133]	[105]	[127]	[136]
(Number in the sample)	(485)	(351)	(122)	(536)	(366)	(113)
Triglycerides						
Mean mmol/L	1.5	2.1	1.9	1.3	1.5	2.1
[mg/dL]	[135]	[184]	[168]	[115]	[134]	[185]
(Number in the sample)	(498)	(369)	(132)	(539)	(369)	(118)

[a] Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more.

TABLE 13

PERCENT DISTRIBUTION OF INDIVIDUALS [a]

BY TOTAL PLASMA CHOLESTEROL LEVELS BY AGE AND SEX

	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
<5.2 mmol/L (<200 mg/dL)	70	42	45	78	50	37	58
5.2-6.2 mmol/L (200-239 mg/dL)	23	36	34	17	35	38	29
≥6.2 mmol/L (≥240 mg/dL)	7	22	21	5	15	25	13
Total	100	100	100	100	100	100	100
(Number in the sample)	(498)	(369)	(132)	(539)	(369)	(118)	(2025)

(a) Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more.

TABLE 14

PERCENT DISTRIBUTION OF INDIVIDUALS [a]

BY LDL CHOLESTEROL LEVELS BY AGE AND SEX

	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
<3.4 mmol/L (<130 mg/dL)	74	50	52	81	57	40	64
3.4-4.1 mmol/L (130-159 mg/dL)	19	37	24	15	25	37	25
4.1-4.9 mmol/L (160-189 mg/dL)	5	10	21	3	12	15	8
≥4.9 mmol/L (≥190 mg/dL)	2	3	3	1	6	8	3
Total	100	100	100	100	100	100	100
(Number in the sample)	(485)	(351)	(122)	(536)	(366)	(113)	(1973)

(a) Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more.

TABLE 15

PERCENT DISTRIBUTION OF INDIVIDUALS [a]

BY HDL CHOLESTEROL LEVELS BY AGE AND SEX

	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
<0.9 mmol/L (<35 mg/dL)	10	16	12	5	4	15	9
≥0.9 mmol/L (≥35 mg/dL)	90	84	88	95	96	85	91
Total	100	100	100	100	100	100	100
(Number in the sample)	(497)	(368)	(131)	(539)	(369)	(118)	(2022)

[a] Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more.

TABLE 16

PERCENT DISTRIBUTION OF INDIVIDUALS [a]

BY HDL CHOLESTEROL AND LDL CHOLESTEROL LEVELS

(ALL AGE AND SEX GROUPS COMBINED)

HDL Cholesterol	<0.9 mmol/L (<35 mg/dL)	≥0.9 mmol/L (≥35 mg/dL)	Total
LDL Cholesterol			
<3.4 mmol/L (<130 mg/dL)	4	60	64
3.4-4.1 mmol/L (130-159 mg/dL)	3	22	25
4.1-4.9 mmol/L (160-189 mg/dL)	1	7	8
≥4.9 mmol/L (≥190 mg/dL)	0	3	3
Total	8	92	100

(a) Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more (Total No. in the sample: 1973).

TABLE 17

PERCENT DISTRIBUTION OF INDIVIDUALS [a]

BY TOTAL PLASMA CHOLESTEROL AND LDL CHOLESTEROL LEVELS

(ALL AGE AND SEX GROUPS COMBINED)

Total Plasma Cholesterol	<5.2 mmol/L (<200 mg/dL)	5.2-6.2 mmol/L (200-239 mg/dL)	≥6.2 mmol/L (≥240 mg/dL)	Total
LDL Cholesterol				
<3.4 mmol/L (<130 mg/dL)	57	7	0	64
3.4-4.1 mmol/L (130-159 mg/dL)	3	19	3	25
4.1-4.9 mmol/L (160-189 mg/dL)	0	3	5	8
≥4.9 mmol/L (≥190 mg/dL)	0	0	3	3
Total	60	29	11	100

(a) Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more (Total No. in the sample: 1973).

TABLE 18

PERCENT DISTRIBUTION OF INDIVIDUALS [a]

BY TOTAL PLASMA CHOLESTEROL AND HDL CHOLESTEROL LEVELS

(ALL AGE AND SEX GROUPS COMBINED)

Total Plasma Cholesterol	<5.2 mmol/L (<200 mg/dL)	5.2-6.2 mmol/L (200-239 mg/dL)	≥6.2 mmol/L (≥240 mg/dL)	Total
HDL Cholesterol				
<0.9 mmol/L (<35 mg/dL)	4	3	2	9
≥0.9 mmol/L (≥35 mg/dL)	54	26	11	91
Total	58	29	13	100

(a) Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more (Total No. in the sample: 2020).

TABLE 19

PERCENT RESPONSES TO QUESTIONS ON CHOLESTEROL MEASUREMENT (ALL AGE AND SEX GROUPS COMBINED)

	Percent %
Ever heard about cholesterol	88
Ever had blood cholesterol measured [a]	18
Was told what blood cholesterol level was [b]	56
Ever told by health professional that blood cholesterol was high [a]	8
Any treatment prescribed or advice given [c]	81
On diet to lower blood cholesterol [c]	39

(a) Among those reporting having heard about cholesterol (Total No. in the sample: 2186).

(b) Among those who reported having had blood cholesterol measured (Total No. in the sample: 412).

(c) Among those who were ever told that blood cholesterol was elevated (Total No. in the sample: 146).

TABLE 20

PERCENT AWARE OF FACTORS RELATED TO

CHOLESTEROL IN FOODS

(ALL AGE AND SEX GROUPS COMBINED)

Factor	Percent %
Cholesterol is found in foods [a]	94
Cholesterol in foods affects health [b]	95
Cholesterol is found in: [c]	
Beef	54
Eggs	54
Pork	42
Whole milk	32
Cheese	28
Poultry	17
Seafood	7

(a) Among those reporting having heard about cholesterol (Total No. in the sample: 2186).

(b) Among those who think cholesterol is found in food (Total No. in the sample: 2056).

(c) Unprompted responses, more than one response allowed.

TABLE 21

PERCENT AWARE OF FACTORS RELATED TO CHOLESTEROL IN BLOOD

(ALL AGE AND SEX GROUPS COMBINED)

Factor	Percent %
Cholesterol is found in blood [a]	86
Blood cholesterol affects health [b]	99
Blood cholesterol affects health by: [c]	
Heart attack	71
Hardening the arteries	57
Increasing blood pressure	35
Stroke	30

(a) Among those reporting having heard about cholesterol (Total No. in the sample: 2186).

(b) Among those reporting cholesterol is found in blood (Total No. in the sample: 1896).

(c) Unprompted responses, more than one response allowed.

TABLE 22

PERCENT RESPONSES TO QUESTION: "WHAT CAN A PERSON DO TO LOWER HIS/HER BLOOD CHOLESTEROL LEVEL" [a] [b]

(ALL AGE AND SEX GROUPS COMBINED)

Response	Percent %
Eat less fatty foods	64
Eat foods with less cholesterol	56
Exercise regularly	29
Use low fat dairy products	16
Lose weight	12
Take prescribed medication	4
Control stress and fatigue	2

(a) Among those reporting having heard about cholesterol (Total No. in the sample: 2186).

(b) Unprompted responses, more than one response allowed.

TABLE 23

PERCENT AWARE OF HEALTH PROBLEMS RELATED TO FAT CONSUMPTION

(ALL AGE AND SEX GROUPS COMBINED)

Problem	Percent %
Fat consumption affects health	80
Health problems related to fat consumption: [a] [b]	
Elevated blood cholesterol	50
Heart disease	49
Overweight	38
High blood pressure	26
Hardening of the arteries	25

(a) Among those who reported that fat consumption affects health (Total No. in the sample: 1998).

(b) Unprompted responses, more than one response allowed.

TABLE 24

PREVALENCE OF REGULAR CIGARETTE

SMOKING [a] BY AGE AND SEX

	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
Prevalence %	39	32	28	44	32	11	35
Survey of smoking habits, 1986 [b] %	40	39	27	31	30	16	34

(a) Regular cigarette smoking is defined as smoking at least one cigarette per day, every day.

(b) Smoking behaviour of Canadians, 1986. Department of National Health and Welfare, Ottawa 1988 (Cat. No. H39-66/1988E).

TABLE 25

PERCENT DISTRIBUTION OF NUMBER OF CIGARETTES SMOKED PER DAY AMONG REGULAR CIGARETTE SMOKERS BY AGE AND SEX

	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
1-10 cigs/day	21	18	20	43	37	30	30
11-25 cigs/day	58	50	65	49	54	66	53
26+ cigs/day	21	32	15	8	9	4	17
Total	100	100	100	100	100	100	100
(Number in the sample)	(231)	(150)	(43)	(253)	(131)	(15)	(823)

TABLE 26

PERCENT DISTRIBUTION OF ALCOHOL

CONSUMPTION BY AGE AND SEX

	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
No alcohol in last year	6	16	30	12	16	57	15
<7 drinks/week	39	37	37	56	59	35	47
7-20 drinks/week	25	27	22	18	17	6	21
≥20 drinks/week	30	20	11	14	8	2	17
Total	100	100	100	100	100	100	100
(Number in the sample	(626)	(424)	(152)	(641)	(421)	(136)	(2400)

TABLE 27

BODY MASS INDEX [a]: MEAN VALUES AND PERCENT DISTRIBUTION BY AGE AND SEX

	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
BMI Mean	26.3	27.7	26.4	25.5	26.9	27.7	26.7
Percent distribution of BMI:							
<20	4	1	8	11	5	6	5
20-25	38	22	26	47	40	15	35
25-27	19	22	24	14	17	24	19
≥27	39	55	42	28	38	55	41
Total	100	100	100	100	100	100	100
(Number in the sample)	(507)	(384)	(137)	(553)	(376)	(119)	(2076)

(a) BMI = weight(kg)/height^2(m) - calculated from clinic measurements.

TABLE 28

NUMBER AND PERCENTAGE OF INDIVIDUALS TRYING

TO LOSE WEIGHT BY LEVEL OF BMI BY AGE AND SEX

	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
BMI [a]							
<25 %	7	3	13	25	23	0	17
(Number in the sample)	(208)	(101)	(43)	(332)	(168)	(28)	(880)
25-27 %	24	17	15	65	34	39	32
(Number in the sample)	(98)	(81)	(33)	(82)	(58)	(26)	(378)
≥27 %	39	37	38	59	57	51	46
(Number in the sample)	(201)	(202)	(61)	(139)	(149)	(65)	(817)

[a] BMI = weight(kg)/height^2(m) - calculated from clinic measurements.

TABLE 29

PERCENT RESPONSES TO QUESTIONS RELATED TO

TRYING TO LOSE WEIGHT BY AGE AND SEX

	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
Presently trying tolose weight	21	25	24	40	39	35	31
Trying to lose weight by: [a] [b]							
Dieting	80	86	100	87	91	79	87
Exercise	58	51	34	65	43	23	52
Skipping meals	17	18	0	22	11	21	17
Weight control programs	1	0	0	15	9	1	7
Diet pills	0	0	0	1	0	0	0
(Number in the sample)	(130)	(102)	(31)	(259)	(166)	(49)	(737)

(a) Among those trying to lose weight.

(b) Unprompted responses, more than one response allowed.

TABLE 30

PREVALENCE OF AWARENESS [a] OF DIABETES

	Percent %
Percent Aware [b]	5

[a] Awareness is defined as ever being told that you have diabetes.

[b] Among the participants who were aware, 25 were diagnosed at age ≤30 years, 90 at age >30 years and 4 were unsure of age at diagnosis.

TABLE 31

PERCENT ENGAGING IN PHYSICAL ACTIVITY

BY AGE AND SEX

	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
Exercise regularly (at least once per week)	60	49	44	56	48	40	52
Most of the exercise is strenuous [a] [b]	59	44	27	37	22	9	40
Length of exercise session is over 30 minutes [a]	83	69	64	56	57	36	65

(a) Among those who reported exercising regularly (Total No. in the sample: 1323).

(b) "Strenuous" is defined as enough exercise to cause sweating or breathing heavy.

TABLE 32

PERCENT DISTRIBUTION OF INDIVIDUALS WITH 0, 1, 2, 3 MAJOR RISK FACTORS [a] BY AGE AND SEX

	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
0 risk factors	41	21	18	44	31	14	32
1 risk factor	44	45	45	45	36	47	43
2 risk factors	13	28	26	11	28	38	21
3 risk factors	2	6	11	0	5	1	4
Total	100	100	100	100	100	100	100
(Number in the sample)	(498)	(369)	(132)	(539)	(368)	(118)	(2024)

(a) Risk factors defined as follows:

Elevated total plasma cholesterol: ≥5.2 mmol/L (200 mg/dL).
High blood pressure: DBP ≥90 mmHg and/or on treatment.
Regular cigarette smoking.

TABLE 33

PERCENT AWARENESS OF CAUSES OF HEART DISEASE [a]

(ALL AGE AND SEX GROUPS COMBINED)

Cause reported	Percent %
Overweight	41
Smoking	40
High blood pressure	32
Excess stress	29
High blood cholesterol	28
Lack of exercise	27
Excess fats	23
Poor diet	21
Heredity	18
Excess salt	17
Foods with high cholesterol	15
Overwork	14
Hardening of the arteries	8

[a] Unprompted responses, more than one response allowed.

TABLE 34

PERCENT OF PARTICIPANTS WITH DIFFERENT CHARACTERISTICS AMONG THOSE WHO COMPLETED THE QUESTIONNAIRE ONLY, OR COMPLETED THE QUESTIONNAIRE AND ATTENDED THE CLINIC [a]

Characteristic	Completed the Questionnaire %	Attended the Clinic [c] only [b] %
High Blood Pressure	21	20
Regular Cigarette Smoker	44	33
Sedentary lifestyle [d]	42	45
Post-secondary education	25	29
Income over $25,000 per annum	50	59

(a) Unweighted data.

(b) Number in the sample: 330

(c) Number in the sample: 2077

(d) Exercise less than once per week.